

natCom₄₂₁

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Set equation 10.11 from the book to 0 and multiply it with e^β .

$$(e^{2\beta} + 1) \sum_{i=1}^N w_i^{(m)} I(y_i \neq G_m(x_i)) - \sum_{i=1}^N w_i^{(m)} = 0$$

$$e^{2\beta} = \frac{\sum_{i=1}^N w_i^{(m)} - \sum_{i=1}^N w_i^{(m)} I(y_i \neq G_m(x_i))}{\sum_{i=1}^N w_i^{(m)} I(y_i \neq G_m(x_i))}$$

$$err_m = \frac{\sum_{i=1}^N w_i^{(m)} I(y_i \neq G_m(x_i))}{\sum_{i=1}^N w_i^{(m)}}$$

$$e^{2\beta} = \frac{1}{err_m} - 1 = \frac{1 - err_m}{err_m}$$

$$\beta = \frac{1}{2} \log\left(\frac{1 - err_m}{err_m}\right)$$

This is equal to equation 10.12 in the book.